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[0001] SYSTEM AND METHOD FOR REDUCING INFORMATION COMMUNICATED BETWEEN UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM MULTIMEDIA CAPABLE UNITS

[0002] This application claims priority to Provisional Patent Application No. 60/294,192, filed on May 29, 2001.

[0003] BACKGROUND

[0004] The present invention relates to wireless telecommunications. More specifically, the present invention relates to a technique for reducing unnecessary consumption of the air link resources and network capacity by reducing the size of transmitted messages.

[0005] The current third generation partnership project (3GPP) and internet engineering task force (IETF) session description protocol (SDP) protocol (RFC 2327) mandate that the proxy call state control functions (P-CSCF), the serving call state control functions (S-CSCFs) and the terminating end user (User Equipment UE) to examine the media contents of the session description protocol (SDP) text in the session initialization protocol (SIP) message.

[0006] Figure 1 shows a simplified session initiation system. A user, UE-A 20, desires to initiate a media session with another user UE-B 40. In Figure 1, UE-A 20 is shown as "roaming" in network A 22, not its home network. UE-A 20 sends a SIP invite message 44_1 to UE-B 40 via network A 22. The UE-A SIP invite 44_1 indicates all the media types that it can support. As shown in Figure 1, the SIP invite 44_1 has a header, global information, and a list of the supported media types (media 1 to media 6). The supported media types include information for each media, such as the CODEC type, stream format, stream bit rate, and communication port number. Under the proposed system, there are no limits on the number of media types that a UE can include in the SIP invite message.

[0007] Figure 2 is an example of a SIP invite message. The SIP invite message has a header, global information and supported media types for UE-A 20 for potential use in the proposed media session. The header includes various overhead information, such as the origin and destination of the SIP invite. The global information includes information common to all the proposed media types, such as the destination address and the proposed session identification (ID) number. The supported media types are listed. In this example, four media types are listed, two video (video media 1 and video media 2) and two audio (audio media 3 and audio media 4). Each proposed media session includes information regarding the media session, such as the port number, real time protocol (RTP) payload type and RTP format and clock rate port.

[0008] UE-A 20 sends the SIP invite to its current network, such as network A 22, in which it is currently located. UE-A may be "roaming," as shown in Figure 1 and communicating with a network, network A 22, or it may be in its home network, network B 30. The SIP invite 44_1 is examined by a P-CSCF 24 of its current network, such as network A 22, for routing to its destination, UE-B 40 via UE-A's home network, network B 30. The P-CSCF 24 examines the session description protocol (SDP) multimedia contents of the SIP invite 44_1 for validation and authorization. If the P-CSCF's network, network A 24, does not support any part of the media information, (such as the CODESs, bit rate or the type), it flags that portion of the media information by setting the port number to "0" and leaving the other contents of the media information untouched, as shown for media 5 and 6 for SIP invite 44_2.

[0009] Figure 3 is an example of such a flagged SIP invite 44. To illustrate, the P-CSCF cannot support video media 1. As shown in Figure 3, the port number is set to "0" so that UE-B 40 realized that video media 1 cannot be selected for the media session.

[0010] The network A P-CSCF 24 forwards the modified SIP invite 44_2 to the network B S-CSCF 26 for further handling, routing and validation. If UE-A 20 is in the home network, both the P-CSCF and S-CSCF function are performed by the home network

30. The network B S-CSCF 26 examines the SIP invite 44_2 including the media information. Media types not supported by UE-A's service license agreement (SLA) are flagged. If UE-A 20 is in its home network, the flagging process is only performed by the S-CSCF 26, not by the P-CSCF 24. The S-CSCF 26 forwards the SIP invite 44_3 to UE-B's home network, network C_{36}, using intorgating-CSCFS (I-CSCF) 28, 32.

[0011] The network C S-CSCF 34 similarly examines the SIP invite 44_3 for media types not available under UE-B's SLA. The not available media types are flagged, as illustrated for media 1 and of SIP 44_4. If UE-B 40 is not in its home network, as shown, the SIP invite 44_4 is forwarded to the P-CSCF 38 of the network, network D 42, where UE-B 40 is currently located, or "roaming." If UE-B 40 is in its home network, the SIP invite 44_4 is forwarded to the P-CSCF 38 of the home network.

[0012] The P-CSCF 38 flags the media types not supported by the network, network D. No additional flagged media types are shown in SIP invite 44_5. If the UE-B is in its home network, the flagging is only performed by the S-CSCF 34. The P-CSCF 38 sends the SIP invite 44_5 to UE-B 40. UE-B 40 examines the media information of the SIP invite 44_5 and determines whether it is capable of using any of the unflagged media types. If it can not use any of the unflagged media types or there are not any remaining unflagged media types, UE-B 40 sends UE-A 20 a session description protocol message (SPM) 46 with all media types flagged. If it can use the unflagged media types, UE-B 40 selects one or more of the available media types for the session. The selected media types unflagged and the flagged media types are returned to UE-A 20 in the SPM 44.

[0013] As shown in Figures 2 and 3, the SIP invite message 44 is large and, accordingly, consumes valuable air interface and wireless network resources. This resource consumption either degrades the network performance or reduces the maximum number of users serviced by the networks.

[0014] Accordingly, it is desirable to have alternate approaches for media session initiation.

[0015] SUMMARY

[0016] The present invention reduces the size of the SIP message by eliminating or deleting unsupported and/or unauthorized media types in the SIP along the signaling route from the originating end user to the terminating one and back. The present invention restricts the media information carried within the SIP message to information that is allowed by the network and authorized for the users at both ends.

[0017] BRIEF DESCRIPTION OF THE DRAWING(S)

[0018] Figure 1 is an example of an overall system diagram for media session initiation.

[0019] Figure 2 is an example of a Session Initialization Protocol (SIP) message.

[0020] Figure 3 is an example of a SIP message with a flagged media type.

[0021] Figures 4a and 4b are signaling diagrams.

[0022] Figure 5 is an example of an overall system diagram.

[0023] Figure 6 is an example of a SIP message.

[0024] Figure 7 is an example of a SIP message with removed media information.

[0025] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0026] Figures 4a and 4b is a signaling diagram of the present invention. Figure 5 illustrates an example of the components of the media session initiation. UE-A 46 desires to initiate a media session with UE-B 68. UE-A 46 and UE-B 48 may be any wireless communication device, such as a mobile phone, personal computer (PC) or personal digital assistant (PDA). UE-A 46 in the system of Figure 5 is shown as "roaming" in network A 50. For Figure 1, network B 58 is the "home" network for UE-A 46. Alternately, UE-A 46 may be in its home network.

[0027] UE-A 46 determines the CODECS available for the media types for the proposed session, (74). A SIP invite 52_1, such as shown in Figure 2, is composed using this

information. UE-A 46 sends the SIP invite message 52_1 intended for UE-B 58 via network A is P-CSCF 48. UE-B 68 is shown as "roaming" in network D 70. Alternately, UE-B 68 may be in its home network, network C 64. The SIP invite 52_1 includes all the media types that UE-A 46 can support and invites UE-B 68 to choose the type(s) that it can support. The media information includes the CODEC types, stream format, stream bit rate, and communication port number, among other media attributes. Under the current proposed system, there are no limits on the number of media types that a UE can include in the SIP invite message 52_1. Furthermore, there are no restrictions on the end user, such as UE-B 68 to include unauthorized unsupported media types.

[0028] The P-CSCF 48, incorporated in network A, routes the SIP invite 52_1 to the end user (UE-B 68). The P-CSCF function 48 initiates examination of the SIP invite message 52_1 for routing and for validation and authorization of the SDP multimedia contents. If network A 50 does not support any part of the media information (such as the CODECS, the bit rate or the media type), P-CSCF 48 deletes the media entry from the SDP message leaving only the supported media entries, (76), as shown as SIP invite 52_2. In the example SIP invite 52_2, media types 5 and 6 have been deleted, since it is not supported by network A 50. Deleting the media type is performed by removing all of the information of the unsupported media type.

[0029] Figure 6 is an example of the SIP invite message 44 of Figure 2 with the media types deleted, as shown as SIP invite 52. To illustrate, network A 50 does not support video media types, (video media 1 and 2). As shown in Figure 6, the information concerning video media 1 and 2 is deleted, leaving only audio media 3 and 4. The P-CSCF 48 then forwards the modified SIP invite 52_2 to the S-CSCF 54 of network B 58 for further handling (routing and validation). The S-CSCF 54 of network B 58 examines the SIP invite 52_2 including the modified SDP message. The S-CSCF 54 will remove unauthorized media types that UE-A 46 is not permitted to use under its SLA, (78). The S-CSCF 54 (which usually exists in the UE home network) also removes any not permitted media contents. In

the Figure 5 example, media type 1 is deleted, as shown for SIP invite 52_3. If UE-A 46 is in its home network, typically both the P-CSCF and S-CSCF function 46, 54 are performed by the home network, with only the S-CSCF 54 deleting media types.

[0030] The S-CSCF 54 forwards the further modified SIP invite 52_3 to UE-B's home network, network C 64, through its I-CSCF 56 (Intorgating-CSCF). After receiving the SIP invite 52_3 via its I-CSCF 60, the S-CSCF 62 of network C 64 removes media types not permitted under UE-B's SLA, (80). After forwarding the SIP invite 52_4 to UE-B's current network D 70, P-CSCF 66 removes unsupported media types of the current network, where UE-B is roaming, (82). As shown in Figure 5, no additional media types are deleted in SIP invite 52_5. If UE-B 68 is in its home network, typically the S-CSCF and P-CSCF functions 62, 66 are performed by the home network, with the S-CSCF 62 deleting the media types.

[0031] UE-B 68 examines the remaining SDP media types of the SIP invite 52_5 and determines if it can support them. If it can, it selects one or more of the remaining media types and sends UE-A 48, a session progress message 72, (84), through the network D P-CSCF 66. If it can not support any of the media types or none remain in the SDP information, UE-B 68 also sends a session progress message with all the media types deleted.

[0032] Figure 7 is an example of a SPM 72. To illustrate a possible derivation for SPM 72, UE-B 68 receives the SIP invite 52 of Figure 6. UE-B 68 is capable of supporting audio media 3. A SPM 72 is generated at UE-B 68 only containing the selected media type, audio media 3, and a header and global information. Audio media type 4 is not included.

[0033] Upon reception of the SPM 72, the P-CSCF 66 authorizes network D 70 to allocated the resources for the sessions indicated by the media type information, (86). The SPM progresses to UE-A 46 through the network C S-CSCF 62, the network B S-CSCF 54 and the network A P-CSCF 48. The network A P-CSCF 48 authorizes network A 50 to allocate the resources for the indicated session(s), (88). After the P-CSCF 48 sends the SPM

72 to UE-A 46, UE-A 46 determines the initial CODEC(S) to use for the media session(s) of the SPM 72, (90).

[0034] UE-A 46 sends a final SPM to UE-B 68, through the same path, indicating the selected CODEC(S). At the same time as sending the final message, UE-A reserves the resources for the selected CODEC, (92), and, if successful, sends a success message to UE-B 68. After UE-B receives the final SPM, it reserves resources for the selected CODEC, (94).

[0035] When UE-B 68 receives the success message, it stops sending messages with its old CODEC, sets up the receiver for the new CODEC and sends an O.K. message to UE-A, (98). After UE-A 98 receives the O.K. message, it sends a success message with the new CODEC and sets up the receiver for the new CODEC, (98). After UE-B 68 receives the success message, it starts sending data with the new CODEC, (100).

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